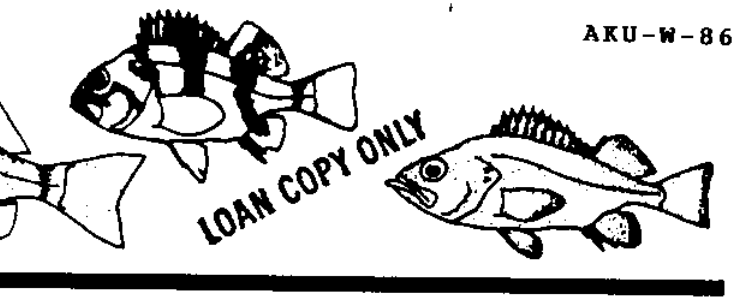

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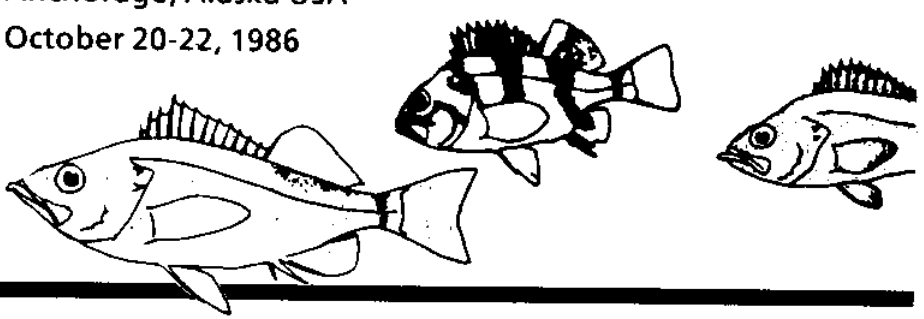

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A history of California rockfish fisheries

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Abstract

Rockfish have been caught off California since prehistoric times. While 60 species are recorded in California waters, less than 20 species make significant contributions to landings by the diverse gears that are used in the fisheries. This paper reviews dynamics in the size and composition of the fishing fleets and landings. Recent events in the fisheries are compared with the history, and important management and research problems of the present are discussed.

History of Landings

Californians have captured rockfish for centuries. California Indians consumed rockfish in prehistoric times (Fitch 1972). Rockfish had attained commercial importance in California by 1875 (Phillips 1957). By the turn of the century, annual landings had reached about 750 mt and there were about 1,500,000 people in the state. Now, with 25,000,000 people, landings of rockfish have increased to 20,000 mt, a 60% gain in landings per capita. The California Department of Fish and Game began compiling fish receipt data in 1916 (Heimann and Carlisle 1970; Figure 1). These data include most landings, but some small landings do not enter normal market channels and are not included.

The landings were fairly stable, generally between 2,000 and 4,000 mt, until the Second World War first interfered with the fishery and then created a large demand. Until 1943, most rockfish were caught by hook-and-line gear; only 5% were landed by trawlers. In late 1943, a boat moved from Astoria, Oregon, to Eureka and used a high-rise trawl called a "balloon trawl" (Phillips 1949). The balloon trawl was very

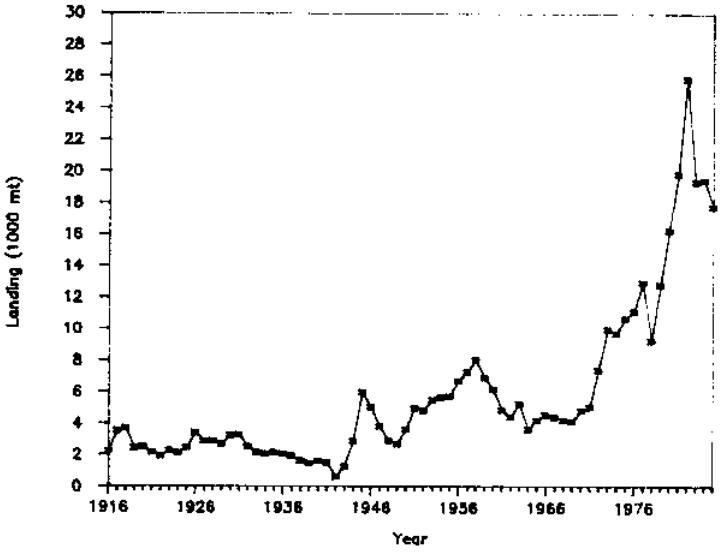

Figure 1. California commercial landings of rockfish, 1916–1985.
Source: 1916–1968 (Heimann and Carlisle 1970),
1969–1970 (Bell 1971),
1971 (Oliphant et al. 1973),
1972–1974 (McAllister 1975, 1976),
1975 (Pinkas 1977),
1976 (Oliphant 1979),
1977–1980 (Frank Henry, personal communication), and
1981–1985 (PacFIN).

effective in capturing rockfish. Use of the balloon trawl spread rapidly and trawl-caught rockfish have dominated the landings since 1944. A peak occurred in landings in 1945 because of the demand from army camps on the West Coast. Landings declined at the end of the war when the camps were phased out.

I did not find explanations for fluctuations in landings between 1950 and 1970. During the past 15 years, landings have increased considerably as the result of better market demand, net design, acoustics, and navigation. Landings peaked in 1982. In that year, many boats from Oregon and Washington fished in northern and central California. These vessels made large landings of widow rockfish (Sebastes entomelas) as well as other species of rockfish. In addition to the expanded trawl effort in the 1980's, gill-net vessels also have increased effort.

Since 1983, widow rockfish landings and, to some degree, landings of other species have been constrained by Pacific Fishery Management Council regulations.

The hook-and-line fishery in the early days was fairly primitive. Most trips lasted less than a day and often the crew size was one. Most fishing took place close to port and in water less than 100 fathoms (Scofield 1947). Landings were dominated by black rockfish (S. melanops) in northern California, bocaccio (S. paucispinis) and chilipepper (S. goodei) in central California, and vermilion rockfish (S. miniatus) in southern California. After the advent of the balloon trawl, canary rockfish (S. pinniger) replaced black rockfish in northern California and bocaccio and chilipepper replaced vermilion rockfish in parts of southern California. Catches of widow rockfish were minor before 1979 when vessels with midwater trawls began targeting on them. In very recent years, bank rockfish (S. rufus) have become more important in landings.

Trawl fishery

It is not very meaningful to discuss solely the California trawl fleet, because many vessels fish in more than one state during the year. The fleet is very dynamic. Of the 600 trawlers that participated in the California, Oregon, and Washington fishery for groundfish between 1981 and 1984, only 400 participated in the 1984 fishery. Of the 200 that didn't, records are incomplete for about half (E. Ueber, personal communication). We do know that about 50 sank or burned, 30 fished in other areas or for other groups of fish, and 30 didn't operate because of bankruptcy or other problems.

Most trawl-caught rockfish enter the fresh fish market as fillets. In recent years, widow rockfish, bocaccio, chilipepper, and bank rockfish have dominated the trawl landings. The ex-vessel price of most trawl-caught rockfish is $0.275/lb. The trawl landings of rockfish in California are worth about $10,000,000.

Gill-net fishery

Another important gear for rockfish in southern and central California is the gill net. This gear is prohibited in northern California. Landings by this gear are not as dominated by widow rockfish, bocaccio, and chilipepper as trawl landings are. Yellowtail rockfish (S. flavidus) and blue rockfish (S. mystinus) are also important.

In 1985, almost 900 vessels were licensed to use gill nets (E. Ueber, personal communication). While I do not have accurate data, probably several hundred gill-net vessels landed rockfish in California.

Our data for California gill-net landings are incomplete, but the catch of rockfish was more than 2,700 mt in 1985. Gillnetted fish tend to be worth more than trawl-caught fish. I estimate that 1985 landings were worth several million dollars to the fishermen. While some gillnetted rockfish are filleted, many enter the market as whole or dressed fish.

A number of problems are associated with the gill-net fishery in California. Besides the usual gear conflicts, there are major incidental kills of seabirds and marine mammals. Because of the problems, there is considerable public support to either ban the gear altogether or severely restrict it.

Hook-and-line fishery

Rockfish are still commercially caught by hook-and-line fishermen in California. While this fishery captures the same species as the other gears, there is a greater tendency to fish for specialized markets such as the Chinese restaurant trade. The brown rockfish (S. auriculatus) and several closely related species are preferred for this market. Fishermen receive as much as $3.00/lb for fish in good condition. Sometimes the fish are kept alive until just before cooking.

I don't have a firm estimate of the number of hook-and-line vessels fishing for rockfish in California. It is approximately 300. 1985 landings were about 1,000 mt. I estimate that these landings were worth 1 to 2 million dollars. Most hook-and-line caught rockfish enter the market as whole or dressed fish.

Recreational fishery

Rockfish are very important for recreational fisheries. Besides being good eating, rockfish can be as large as 28 lbs (such as the cowcod, S. levis), can be very colorful (such as the starry rockfish, S. constellatus), and can be very attractive when viewed underwater (such as the treefish, S. serriceps). While catches are usually dominated by one or two species, we have sampled more than 12 species on a single party-boat trip. The variety is appealing to some anglers.

While the California recreational fishery probably is worth more than commercial fisheries of most nations, it is not very well documented. This is because it is difficult to adequately sample recreational landings. Statistics have been collected from the party-boat fishery

through a logbook system since 1936 (Collyer 1949, Young 1969). Since 1981, the entire fishery has been sampled by a phone interview and field sampling program (U.S. Department of Commerce 1986).

The party-boat fishery is concentrated in southern California. Prior to the 1950's, rockfish did not support a major targeted fishery in southern California. Anglers preferred the then abundant barracuda (Sphyraena argentea). Barracuda numbers declined and rockfish became very important in the party-boat fishery. The party-boat fishery for rockfish is still minor in northern California.

In 1985, recreational anglers landed almost 8,000,000 rockfish in California (U.S. Department of Commerce 1986). The fish weighed about 4,000 mt. Rockfish comprised almost 1/3 of all recreational fish landed in the state and are the most important group of species. Forty-six species of rockfish were sampled from recreational catches in 1984. However, three species--blue rockfish, black rockfish, and yellowtail rockfish--represent about 30% of the landings. Boat anglers make more than 90% of the landings. Landings from party boats and private boats are about equal.

Economists have yet to agree on how to determine the value of a recreational fishery. One method is to appraise all costs associated with fishing trips. Using this approach, economists estimated that the California recreational fishery for all species is worth about a billion dollars (D. Huppert, personal communication). This is not equivalent to the commercial fisheries values, because there are many factors included in the recreational value not included in the ex-vessel value of commercially landed fish. Still it appears that the recreational value significantly exceeds the commercial value. Agencies recognize this when making management decisions.

Status of fishery

Most stocks of traditional rockfish species in California are at or below the MSY level. Some, such as bocaccio, may be overfished. Present regulations consist of a quota on widow rockfish, 40,000-lb trip limits on commercially caught fish, and a 15-fish bag limit for recreational fish. There are also various gear and area restrictions. The objective of many of the area regulations is to reduce gear conflicts, particularly between recreational and commercial fishermen.

While most of the traditional species are fully utilized, two appear not to be. Recent analysis indicates there is some room for expansion in landings in chilipepper. In addition, bank rockfish landings have increased in recent years. They occupy a habitat that had only been lightly fished previously.

There are two other abundant, lightly exploited species. The splitnose rockfish (S. diploproa) is quite abundant. However, it is a very long-lived species and, while the fishery probably could be expanded some, care is needed in such an expansion because the species could easily become overfished. It is a marginal commercial fish because it produces low fillet yields and is fairly small. Shortbelly rockfish (S. jordani) is very abundant and short-lived. The species probably could support a fishery about the size of the other species combined.

However, it is quite small (maximum size about 30 cm) and must be processed rapidly.

Species targeted by recreational fisheries in southern and central California appear to be fully utilized. Some of the expansion of the recreational fishery has come at the expense of the commercial fishery. Several nearshore species--e.g., black, blue, and yellowtail rockfish--appear to be lightly fished in northern California. Recreational fishing in this area is limited because of the distance from population centers.

Discussion

During historical times the commercial fishery has passed through several phases (Figure 1). Between 1916 and 1947, landings were generally between 2,000 and 4,000 mt. During the Second World War, fishing techniques and markets improved and landings increased to between 4,000 and 8,000 mt until 1971. Since then, techniques and markets have again improved and landings are now about 20,000 mt. The status of exploited species indicates that landings will be between 10,000 and 30,000 mt until other species are harvested. If an increase occurs, it would be a repeat of history. The previous major increases involved changes in the relative importance of species. A future major increase also is likely to involve changes in species composition of landings. Shortbelly and splitnose rockfish are likely to contribute to increased landings. As in the past, improved market conditions are a prerequisite to increased utilization of these two species.

History may also be repeated in the recreational fishery. Significant expansion of recreational landings of rockfish in southern and central California is not likely to occur without reduction of commercial landings.

Management and researchers involved with California rockfish fisheries face several major problems including conflicts between recreational and commercial fisheries. I have already mentioned the gill-net problem. There also appears to be some overcapitalization. The industry, researchers, and managers have been discussing various forms of limited access management, but implementation of such management appears to be years, if not decades, off. Fluctuations in year-class strength cause the fishery to be somewhat unpredictable. Research aimed at this problem is discussed in another paper (Kendall and Lenarz 1987). Researchers are also attempting to develop optimal management strategies that account for the multispecies aspects of the fishery. Finally, monitoring the fishery is quite expensive. We are working on procedures to make sampling more efficient.

Acknowledgments

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